



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/790,931

03/01/2004

Takemori Takayama

04005/LH

3234

1933 7590 03/01/2007  
FRISHAUF, HOLTZ, GOODMAN & CHICK, PC  
220 Fifth Avenue  
16TH Floor  
NEW YORK, NY 10001-7708

EXAMINER

YEE, DEBORAH

ART UNIT

PAPER NUMBER

1742

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

03/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/790,931

Applicant(s)

TAKAYAMA ET AL.

Examiner

Deborah Yee

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-15,17-20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-15,17-20 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1-23-07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1-23-07 has been entered.

### ***Double Patenting***

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 3 to 15, 17 to 20 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of

Art Unit: 1742

copending Application No. 10/790,959 or 11/234,959. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the reasons stated in the previous office actions dated 12-08-05 and 6-09-06.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 9,10,11,12 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claims 1, 11,12 and 17, each recites a steel material comprising 0.45 to 1.5% C and 0.3 to 1.5% Cr yet it further recites "when the C content is 1.5%, the Cr content is less than 1.8%" which is indefinite because the Cr content of "less than 1.8%" is higher than the initial Cr amount of "0.3 to 1.5%". Hence the Cr range is unclear.

7. Claim 12 recites a C content in the range of "1.2 to 1.5 %" yet it further recites "when the C content is 0.55%, the Cr content is 0.3% or more" which is indefinite because the C content of "0.55%" is much lower than the C content of "1.2 to 1.5%". Hence the C content is unclear.

Art Unit: 1742

8. Claim 9 is indefinite because it recites the total carbon content in the case-hardened layer to be "0.5 to 1.5% C yet its parent claim recites the total carbon content to be "0.25 to 0.8% carbon".

9. Claim 10 is indefinite because the unit of measurement for hardenability DI (e.g. HB , HRC or HV etc.) or the unit of measurement for pitch diameter (inches, mm etc) are not recited in claim or disclosed in the specification.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 3 to 8 and 17 to 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Monma et al (US Patent 3,663,314)

12. Monma specific bearing steel examples 14 to 19 in Table IV in columns 3-4 meet the composition and surface layer limitations recited by claim 1. Note examples contain Cr and C within the ranges of 0.45 to 1.5% C and 0.3 to 1.5%Cr recited by claim 1, and have a quench-hardened surface layer tempered at low temperature whereby surface layer contains cementite (designated as C percent in Table IV) within the vol% range of 2 to 18% dispersed in a martensite parent phase and solid-dissolving carbon (designated D in Table IV) within the range of 0.25 to 0.8% recited by claim 1.

13. Even though Cr concentration in cementite at 2.5 to 10 % recited by claim 1 is not taught, such would be expected since composition and process of making

Art Unit: 1742

limitations are met. See lines 5 to 20 of column 5 wherein steel is subjected to normalizing (normalizing is defined as heat treating in austenitic temperature range A1 or higher followed by air cooling, and is equivalent to Cr concentration treatment step recited by claim 18), spheroidize annealing and case hardening by austenitizing, oil quenching and tempering.

14. Monma on line 7 of column 5 discloses mean carbide particle size (cementite) at 0.6 microns which is within the average cementite particle diameter of 0.1 to 1.5 microns recited by claim 3.

15. Although pearlite or retained austenite as recited by claims 4 and 5 respectively are not disclosed by Monma such would be expected since composition and process limitations are met, and in absence of proof to the contrary.

16. Even though a prior austenite grain size of ASTM 10 or higher recited by claim 6 is not taught, such would not be a patentable difference since it is a past rather than a present property.

17. Monma discloses specific bearing steel examples 26 to 32 in Table VII of column 7 containing Si; and hence meet claim 7.

18. Monma meets claim 8 because claim recitation only requires Ni when Al is added.

19. In regard to process claims 17 to 19, Monma on lines 5 to 20 of column 5 discloses normalizing (heating at austenitic temperature range and cooling) which is equivalent to applicant's Cr concentration treatment step of heating at A1 to 900C

Art Unit: 1742

followed by cooling, spheroidizing and case hardening by austenitizing, quenching and tempering.

***Claim Rejections - 35 USC § 103***

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. Claims 10 to 15, 20 and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Monma et al (US Patent 3,663,314) in view of Choe et al (US 2002/0029597).

22. Monma steel meets the present invention for the reasons stated in the 102 rejection and further teaches using steel for a rolling bearing element which would include a gear as recited by claims 10 to 15. Moreover even though prior art does not teach shot peening as a finishing step to produce a residual compressive stress on the surface of the rolling bearing element as recited by claims 10 to 15, 20 and 22, such would not be a patentable difference. Note that Choe et al. in paragraph 23 discloses subjecting a rolling bearing element (gear) with an induction hardened martensitic surface to shot peening to produce a high compressive residual stress of at least 50 kgf/mm<sup>2</sup> to improve fatigue strength is known in the art. Since fatigue strength is desired and sought by Monma, then it would be an obvious process step well within the skill of the artisan to incorporate.

Art Unit: 1742

23. Even though prior art does not teach the DI formula as recited by claim 10, such would not be a patentable difference since applicant has not demonstrated (e.g. by comparative test data) that claimed formula is somehow critical and productive of new and unexpected results.

24. Claims 1, 3 to 15, 17 to 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over European patent 950723 in view of the English abstract of Japanese patent 406025736 o 360162726.

25. EP'723 in claims 1 to 10 on page 13 discloses a case-hardened martensitic rolling element which is made from a steel material comprising a composition with constituents and cementite whose ranges overlap those recited by the claims. Note that such overlap establishes a prima facie case of obviousness because it would be obvious for one skilled in the art to select the claimed ranges over the broader disclosure of the prior art since the prior art teaches the same utility, see MPEP 2144.05.

26. EP'723 in claims 1 and 5 disclose cementite having an average grain size of 3  $\mu\text{m}$  and overlaps claim 3 range of 0.1 to 1.5  $\mu\text{m}$ . Even though a Cr concentration of 2.5 to 10 wt% in the cementite ((Fe,Cr)<sub>3</sub>C) as recited by claim 1 is not taught by prior art, such would be expected since prior art in paragraph 43 teaches the Cr concentration heat treating step of reheating after hardening at A1 to less than 900C.

27. EP'723 in paragraph 43 discloses rolling contact surface can contain pearlite which would suggest claim 4, and in paragraph 25 discloses a residual retained



Art Unit: 1742

austenite at 20 to 80 vol% with a preferred range of 20 to 60 vol% and is within the range of 10 to 60 vol% recited by claim 5.

28. Even though prior art does not teach prior austenite grain having an ASTM grain size No. 10, such would be expected since composition and process of making are closely met. Moreover, prior austenite grain size is an intermediate property to make a final product which would not be of patentable weight.

29. Prior art claims 1 to 11 disclose alloying constituents with wt% ranges that would overlap and therefore suggest the compositional limitations recited by dependent claims.

30. EP'723 in paragraphs 1 and 63 and figure 12 disclose producing a gear, and also shot peening to generate a compressive residual stress of 50 Kgf/mm<sup>2</sup> or more to improve fatigue strength which meets one or more of the recited claims. Even though the DI equation for the gear as recited by claim 10 is not taught by prior art, such would not be a patentable difference since the high hardness property attributed to the equation is taught.

31. With regard to method claims, prior art in paragraph 43 teaches hardening by carburizing or carbonitriding at 930 to 1100C to obtain a surface carbon content with the range of 1.1 to 2% (overlaps claimed carbon surface range of 0.5 to 1.5%) followed by quenching to less than A1 temperature to obtain a martensitic microstructure, heat treating by reheating to A1 temperature or more and less than 900C (within the recited range of A1 to 900C recited by claim 18).

Art Unit: 1742

32. Even though tempering at 100 to 300C as recited by method claim is not taught by prior art, such would not be a patentable difference. Note that it is well known in the art and conventional practice to temper case-hardened steel gear to further strengthen and relieve stress as evident by the English abstracts of Japanese patents '736 and '726I and hence would be obvious for one skilled in the art to incorporate to the EP process.

33. Even though heating by induction at a rate of 150C/sec or more is not taught by prior art, such would not be a patentable difference since choice of heating means would be a matter well within the skill of the artisan and productive of no new and unexpected results. Moreover preheating before hardening is a well known and conventional practice to create temperature uniformity and would be a matter of choice well within in the skill of the artisan to incorporate.

### ***Response to Arguments***

34. Applicant's arguments filed 1-23-07 have been fully considered but they are not persuasive.

35. It was argued claims are not indefinite because recited limitation is directed to a proportion of the C content to the Cr content such that the Cr content less than 1.8% does not mean that Cr is actually contained in an amount of 1.8% but is intended to indicate the proportional relationship between C and Cr. It is the examiner's position that a proportion or ratio is not recited by rather the actual amounts of C and Cr contained in the steel. Note first paragraph on page 20 of applicant's specification wherein the amount of Cr contained in the steel when 0.53 to 1.5% C is added and is

Art Unit: 1742

preferably adjusted to 1.8% or less and in view of economical efficiency, a preferable amount of Cr is 1.5% or less. Specification does not suggest 1.8% times the proportion of carbon.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deborah Yee whose telephone number is 571-27211253. The examiner can normally be reached on monday-friday 6:00am-2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Deborah Yee  
Primary Examiner  
Art Unit 1742

dy